Syllabus

Call Numbers: TBD

Credits: 3.0

Course Goals

This is course intended to facilitate your introduction to flexible and printed electronics technologies, an 'ecosystem' of electronic and optical devices and fabrication technologies that builds mixed-signal integrated electronic systems, displays, optical devices as well as energy harvesting and storage systems on flexible substrates such as plastic, paper and textile. Referred to as ***Flextronics*** here on, this technology has remarkable potential for innovation, and incorporates, more or less, every device technology conventional 'hard' electronics and photonics have in store. As such, it covers a very large body of knowledge which is surveyed in this class by use of review papers, technical reports from experts and research articles. In an orthogonal fashion, essential materials and fabrication tools, device principles and examples as well as major application areas are targeted in this class with an objective of introducing students to opportunities, challenges and interdisciplinary context of flextronics that is expected to drive sizeable market expansion and novel solutions in electronics in the next decade. In particular the following materials and subjects will be the focus of this class

- ***Flexible Substrates****: plastic, paper and textiles for electronics*
- ***Transfer printed CMOS:*** *Ultra-thin & bendable chips*
- ***Printing Technologies & Tools*** *for flextronics*
- ***Inks for Printing and Flextronics****: Carbon, metallic and polymeric inks*
- ***Ultrathin Power Devices:*** *Printed & Flexible Batteries & Supercapacitors*
- ***Flexible Photonics:*** *Displays & OLEDs*
- ***Flexible Photonics:*** *Solar Cells and Waveguides*
- ***RF/Microwave Devices & Antennas***
- ***Flexible Sensors***
- ***Future Challenges & Applications***

Instructors:

Dr. Savas Kaya
Office: 363 Stocker Center Phone: 597-1633 (Office) E-mail: *kaya@ohio.edu*.
Office Hours: 12:00pm-1:30pm Mon Tue Wed Thr

Hours and Room

We will meet once a week (TBD, most likely Wed 7:00pm) for an live online review session of the weekly materials in the 'flipped classroom' model.

Texts

No text books: We will be using many review and research articles, online resources and publicly available technology reports to be posted on the Blackboard.

Assignments

Exams

No formal exams. However, you will give two presentations (~Week 7 & Finals Week) and prepare two reports: one in a device/printing technology and one on an application area of your choice.

Exercises & Quizzes
There will be three quizzes to evaluate your understanding of review papers used for reading and class discussions

Laboratory
No Laboratory work is involved.

Attendance
We will meet once a week – please do not miss these meetings without a valid excuse. It is essential that this class works as 'readin/review club', where students as well as the instructor provide feedback and explain materials explored to the whole group.

Grading

Your final grades will be based on the following percentages of evaluation components:	Final letter grades will be assigned from the following scale:
Quizzes: 20%	**A** : 93-100 **A-** : 90-92
Midterm Presentation (20%)	**B+**: 87-89 **B** : 83-86 **B-** : 80-82
Final Presentation (20%)	**C+**: 77-79 **C** : 73-76 **C-** : 70-72
Midterm Report (20%)	**D+**: 67-69 **D** : 63-66 **D-** : 60-62
Final Report (20%)	**F** : 00-59

Collaboration
You will work alone in the quizzes and assignments. For weekly assignments students are encouraged to work in teams of two or three to discuss/review course materials and tasks.

Work Load
Due to its interdisciplinary nature this is a demanding course. Students are expected to commit adequate time and effort in attending the class sessions and returning the assignments on time. In doing so, they may easily spend as much as 8-10 hours/week on the course-related works. Students expecting an A in this course hence must guarantee this level of commitment or may expect a lower grade in failing to do so.

Academic Honesty
Instances of academic dishonesty could result in an "F" for the course and a referral to the OU judiciaries. Academic dishonesty includes, but is not limited to, the following examples: permitting another student to plagiarize or cheat from your work (Cheating implies dishonesty or deception in fulfilling academic requirements. Plagiarism involves the presentation of some other person's work as if it were the work of the presenter.), submitting an academic exercise (written work, printing, sculpture, computer program) that has been prepared totally or in part by another, acquiring improper knowledge of the contents of an exam, using unauthorized material during an exam, submitting the same paper in two different courses without knowledge and consent of professors, or submitting a forged grade change slip.

Classroom Privacy
Recording of classroom activities by any electronic means, by students, other faculty, university administrators, or others, requires permission of the instructor. All students in a class must be informed if permission has been given for a class to be recorded. Under no circumstances may verbatim recording of copyrighted classroom lectures and materials by electronic or any other

means (including note taking) be conducted for 1) sale, whether or not it is for educational benefit, or 2) for the educational benefit of those not enrolled in the class. This does not apply to non-verbatim notes taken by students.

Disabilities

If you have a documented disability and wish to use accommodations in this course, please discuss this with the course Instructor early in the quarter.

Due date

All homework, projects and papers have to be turned in before or on due date. NO LATE ASSIGNMENT ACCEPTED POLICY.

Tentative Plan

The table below provides a 'tentative' schedule for this course, subjects of focus and typical assignments

Week	Focus	Readings	Assignment
1	Introduction to Flextronics	TBD	-
2	Flexible Substrates	TBD	HW1
3	Printing Tools & Processes	TBD	HW2
4	Inks for Electronics & Photonics	TBD	***Quiz 1***
5	Transfer Printed CMOS	TBD	HW3
6	Printed Transistors	TBD	HW4
7	Power Devices	TBD	***Quiz 2***
8	**Mid Presentations: TECHNOLOGY**	TBD	-
9	Flexible Photonics: Displays & OLEDs	TBD	HW5
10	Flexible Photonics: PVs & Waveguides	TBD	HW6
11	RF Microwave Devices	TBD	HW7
12	Flextronics: Sensor Examples	TBD	HW8
13	Flextronics: Sensor Examples	TBD	***Quiz 3***
14	Flextronics: Future Apps Examples	TBD	-
15	**Final Presentations: APPLICATIONS**	-	-